MA.6197C
PRE-SELECTION AND PROTECTION UNIT

TECHNICAL MANUAL

RACAL

RACAL COMMUNICATIONS, INC.

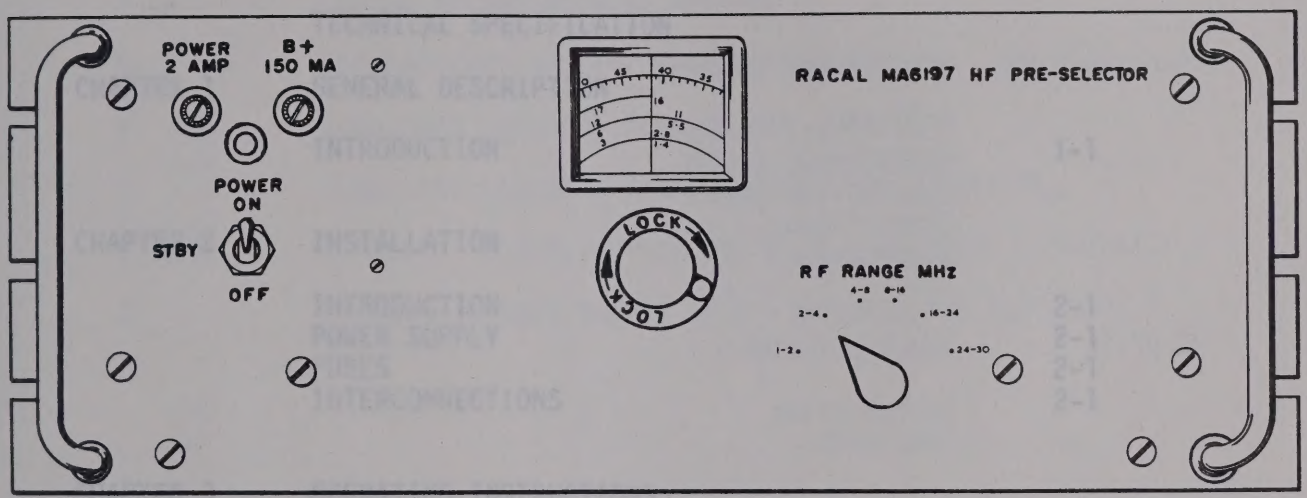
5 RESEARCH PLACE, ROCKVILLE, MARYLAND 20850
(301) 948-4420 • TELEX: 898-456 • CABLES: RACAL USA

ERRATA

Section 2, Page 2-6

After paragraph 5(8) delete selectivity chart and tolerance paragraph in its entirety and substitute the following selectivity chart.

RANGE (Mc/s)		FREQUENCY (Mc/s)	ATTENUATION	Kc/s OFF- TUNE
2	xz	2	94	± 100
2		3	94	± 150
2		4	94	± 200
3		4	94	± 200
3		6	94	± 300
3		8	85	± 400
4		8	90	± 400
4		12	90	± 600
4		16	90	± 800
5		16	80	± 800
5		20	80	± 1000
5		24	80	± 1200



MA6197 (C)

Pre-selection and Protection Unit

PRE - SELECTION AND PROTECTION UNIT

TYPE MA6197C

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7	Circuit: Power Supply Unit - MA6197C and Fail Safe Circuit.

ILLUSTRATIONS

SECTION 2

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3	Interconnections for Receiver Unit - MA6197C.
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5	Component Layout: Chassis Underside - MA6197C.
6	Circuit: Pre-Selection and Frequency Unit - MA6197C.
7	Circuit: Power Supply Unit - MA6197C and Fail Safe Circuit.

TECHNICAL SPECIFICATION

Frequency Ranges:	1 to 30 MHz in 6 ranges.
Input Impedance:	92 ohms when used with common aerial/antenna systems and 75 ohms.
Output Impedance:	75 ohms.
Selectivity:	80 to 100 dB attenuation for signals 5% off-tune (2-24 MHz only).
Noise Factor:	12 dB over all ranges 1 to 5 when used with an RA6117 (or equal) Receiver, providing switch on receiver is set to required range for 1-2 Mc and to WIDEBAND for ranges 2 to 5. 15 dB for range 6 with receiver switch on 24 to 30 Mc.
Overall Gain:	6 dB nominal (2-24 MHz, ranges 2-5 only).
Power Supply:	100-125V or 200-250V, 44-65 Hz, 25 watts approximately.

Dimensions:	Height	Width	Depth
	7 in.	19 in.	18 7/8 in.
	17.8 cm.	48.2 cm.	48 cm.

Weight:	45 lb (20.5 kg.).

CHAPTER 1

GENERAL DESCRIPTION

INTRODUCTION

1. The pre-selection and protection unit Type MA6197C is designed to solve the problem of successfully operating h.f. receivers in close proximity to high-power transmitters, where it is essential not only to reduce break-through, but to prevent physical and electrical damage to the receivers. This condition, unavoidable in ship installations, can also exist where transmitters and receivers are installed in the same building.

2. In addition to preventing break-through and receiver damage the insertion of the MA6197C between the aerial/antenna and the h.f. receiver input gives a high degree of pre-selection, thus reducing adjacent channel interference and intermodulation products. An unwanted signal 5% off-tune has an attenuation greater than 80 dB (2 to 24 MHz , ranges 2 to 5); this attenuation of unwanted signals is achieved without reduction of overall gain and with minimum effect on sensitivity.

3. The unit protects receivers, in the range 2 to 24 MHz against burn-out due to excess input since it withstands, without damage, radio frequency e.m.f's of up to 40 volts. The unit can be used with single receivers or in any installation where common aerial/antenna systems are employed.

4. The MA6197C is supplied in varied models denoted by suffixes i.e. MA6197C etc. To determine the exact model in hand refer to rear panel label.

CHAPTER 2

INSTALLATION

INTRODUCTION

1. The pre-selection and protection unit Type MA6197C is designed to be mounted on a pair of slide runners in a standard 19 inch rack, or fitted into a cabinet assembly.

POWER SUPPLY

2. Check that the MAINS VOLTAGE ADJUSTMENT selector plugs are inserted to match the correct mains/a.c. supply voltage available and ensure that the POWER switch is set to OFF.

FUSES

3. Ensure that the power supply unit fuse ratings are correct:-

Power supply fuse

Mains (a.c.) power supply:	200-250V	2A
Mains (a.c.) power supply:	100-125V	5A
B+ supply fuse (H.T.)		150 mA

INTERCONNECTIONS

4. (a) Connect the main power source to the MAINS plug (PL1) as follows:-

LINE volts to pin A
NEUTRAL to pin B
GROUND to pin C

(b) Connect the aerial to the AE IN (antenna input) socket (SKT1)

(c) Connect AE OUT (antenna output) socket (SKT2) directly to ground if one receiver only is fed from the aerial. If two or more receivers with their associated pre-selection and protection units are used in common aerial systems the aerial connections should be made as shown in Fig. 2 and should be terminated with a 92 ohm 1/4W 5% resistor as shown.

(d) Connect the RF OUT socket (SKT3) to the AE IN socket on the h.f. receiver.

CHAPTER 3

OPERATING INSTRUCTIONS

INTRODUCTION

1. The controls shown in capitals in the following paragraphs are in accordance with front panel markings.

FUNCTION OF CONTROLS

2.	POWER	Mains (a.c.) supply ON/STBY/OFF switch.
	RF RANGE MHz	Provides selection of any one of six antenna frequency ranges:- 1-2, 2-4, 4-8, 8-16, 16-24, 24-30 megahertz.
	Tuning Control	Selects the required frequency of operation.

PRELIMINARY SETTINGS

3. (1) Set the POWER switch to ON (up).

(2) Set the RF RANGE MHz switch to the required range.

(3) Set the tuning control to the required frequency of operation.

OPERATION

4. The tuning control and the RF RANGE MHz switch, should be set to coincide with the operating frequency of the h.f. receiver in the installation.

CHAPTER 4

BRIEF TECHNICAL DESCRIPTION

Introduction

1. The circuitry of the MA6197C may be considered in two sections, the pre-selection section (Fig. 6) and the power unit section (Fig. 7).

PRE-SELECTOR SECTION

Simplified Circuit

2. When either the 1-2 MHz or the 24-30 MHz range is selected the aerial (antenna) is coupled by a tuned circuit to the output socket, as shown in the simplified diagram in Fig. 1. The aerial (antenna) output AE OUT socket SKT2 is connected directly to ground if the aerial feeds one receiver only, or to a further MA6197C unit if two or more receivers are fed from a common aerial (see Fig. 2).

3. When one of the other four ranges of the unit is in use the aerial input is again fed to a tuned coupling transformer, but further amplification and tuning takes place in the unit before the r.f. reaches the output socket. The following discussion covers the 16-24 MHz range only, as shown on Fig. 1; the 2-4, 4-8 and 8-16 MHz tuning range circuits are similar to the 16-24 MHz circuit.

4. The output from the tuned circuit L15, C44 is fed to a cascode amplifier V1B and V1A. The plate load of V1A is a tuned circuit L20/C36 coupled to a second tuned circuit L24 and C63. The output from the second tuned circuit is fed to a further cascode amplifier V2B and V2A, and then another tuned circuit L35 and C79 via a tuned circuit L31/C64. The output from L35/C79 is fed, via R.F. output socket SKT3, to the receiver.

5. All the six variable capacitors shown in Fig. 1 are ganged together, and are used for tuning the circuits to the required frequency.

Individual and Common Aerial/Antenna Systems

6. If an aerial is used for feeding one receiver (via its MA6197C) only, the aerial AE OUT output socket SKT2 is connected directly to earth. If two or more receivers (and their protection units) are to be fed from one aerial, the aerial connections should be connected as shown in Fig. 2.

6. (cont'd)

When two or more receivers are fed as shown each receiver MA6197C combination can be tuned to any frequency without inter-action between receivers.

POWER UNIT SECTION

7. The mains (AC Line) voltage supply is fed to the primary winding of the transformer T1. The line input to the transformer is protected by a fuse; decoupling capacitors are fitted to both the line and neutral inputs.

8. One secondary winding of the transformer feeds a full-wave bridge rectifier circuit. The output from this circuit is smoothed and the +320V output is fed to the pre-selector section as the B+ supply. A further secondary winding on the transformer provides a 6.3V supply for the heaters of the tubes V1, V2 and the indicator lamp.

FAIL SAFE

9. The MA6197C Pre-Selection and Protection Unit is designed to provide a power supply Fail Safe function. Should the MA6197C power supply fail input signals from the antenna are automatically routed directly to the system receiver. The circuit also provides a POWER ON/STBY/OFF switch.

CHAPTER 5

DETAILED TECHNICAL DESCRIPTION

Introduction

1. The pre-selection and protection unit MA6197C is designed to solve the problems associated with operating receivers in close proximity to high powered transmitters and to give a high degree of pre-selection to incoming signals over 2 to 24 MHz ranges 2-5.

PRE-SELECTION UNIT

2. The r.f. input signal from the aerial (antenna) is fed from AE. IN socket SKT1 to the appropriate coupling coil L1 - L6 via switch wafer SA1F. The coil selected depends upon the frequency range in use. Unselected coils are connected to ground via switch wafer SA1B. Switch wafer SA2F is used to connect the appropriate coil to the aerial output AE. OUT socket SKT2, wafer SA2B grounds the outside side of coils not selected. It should be noted that all switch wafers are ganged and together form the R.F. RANGE MHz switch. The aerial coil windings are heavy enough to withstand r.f. potentials up to 40 volts. The MA6197C prevents damage by break-through, in the range 2 to 24 MHz, to the receiver it is linked to when operating close to a transmitter.

3. The aerial coils couple to tuned circuits covering the ranges listed below. Selection of the particular tuned circuit required is carried out by switch wafers SA3F and SA4F, tuned circuits not selected are grounded by SA3B and SA4B. The aerial coupling coils form low-pass filter circuits each having a bandwidth exceeding 30 MHz, so that when a common aerial (antenna) system for two receivers is used each can be tuned to a differenct frequency range without one receiver or pre-selection unit affecting the second receiver/ pre-selection unit combination.

MHz	Coils			
1 - 2	L1 L7			
2 - 4	L2 L8		L9	
4 - 8	L3 L10	Tuned	L11	Tuned
8 - 16	L4 L12	by	L13	by
16 - 24	L5 L14	C37	L15	C44
24 - 30	L6 L16			

The coils L2 to L5 and L8 to L15 are loosely coupled, and are connected to the remainder of the circuit via capacitors C33 to C35 and C38, to obtain the required signal level at V1B grid.

4. When either the 1-2 or 24-30 MHz range is selected the output from the tuned circuit L7 and C37 (1-2 MHz) or L16 and C37 (24-30 MHz) is fed to the R.F. OUT socket SKT3 via SA13F without affecting the remainder of the circuitry in the pre-selector unit.

5. When one of the four remaining ranges is selected (2-4, 4-8, 8-16 or 16-24 MHz) the output from the tuned input circuit is fed to valve V1B and V1A, which form a low-noise cascode amplifier circuit, through switch wafer SA5F. Unselected circuits are grounded through SA5B.

6. The output from V1A is taken, through SA6F, to the appropriate tuned circuit for the range selected; the tuned circuit, selected, forms the plate load for tube V1A. The circuits are listed below:

MHz range	V1A Plate load tuned Circuits			
2 - 4	L17		L21	
4 - 8	L18	with	L22	with
8 - 16	L19	C36	L23	C63
16 - 24	L20		L24	

Variable capacitors C36 and C63, selected by switches SA7F and SA8F, are used to tune the plate load circuits to the correct frequency.

7. The primary coils L17 to L20 of the unused plate load tuned circuits (all four circuits when either 1-2 or 24-30 MHz is selected) are connected directly to B+ by switch wafers SA6B and SA7B to avoid any unrequired coupling taking place. Switch wafer SA8B connects unused secondaries to ground for the same reason.

8. The secondary of the selected plate load circuit of tube V1A is fed via switch wafer SA9F to the grid of tube V2B. The unused inputs to V2B are grounded through switch wafer SA9B. Tube V2B, with V2A, forms a second low-noise cascode amplifier having as a plate load a further tuned circuit, as listed below:-

MHz range	V2A Plate load tuned Circuits			
2 - 4	L28		L32	
4 - 8	L29	with	L33	with
8 - 16	L30	C64	L34	C79
16 - 24	L31		L35	

9. The primary of the appropriate plate load tuned circuit for V2A is selected by SA10F and SA11F, SA10F connects V2A plate to a tap of the selected primary, SA11F connects one side of the primary to the variable capacitor C64. The remaining connection of the primary coil is connected to B+ via resistors R14 to R17. Coil L31 is not tapped but its operation is similar to that described above. Both sides and the tap of the primary coils not selected (all four when either 1-2 or 24-30 MHz is selected) are connected to B+ via switch wafers SA10B and SA11B.

10. The required secondary coil of the tuned circuit forming the plate load for V2A is selected by wafer SA12F and tuned by C79. Unselected secondaries are grounded through SA12B.

11. The output of the unit, either from L7 or L16 in 1-2 or 24-30 MHz ranges respectively, or from L32 to L35 in either of the other four ranges, is controlled by switch SA13F, which feeds the output socket RF OUT SKT3. Unused output connections are grounded by SA13B.

12. Not used.

13. The overall gain of the pre-selection unit is not less than 6 dB. The overall noise factor of an MA6197C and RA6117 combined is not greater than 12 dB providing that the receiver aerial selector is set to agree with frequency range selected for either 1-2 or 24-30 MHz ranges, or is in 'wideband' position for the other frequency ranges.

Common Aerial/Antenna Systems

14. This system enables several receivers to operate from one aerial, and allows each receiver and its associated MA6197C to be tuned to operate at any frequency within its coverage. The common aerial working system diagram (Fig. 2) shows two MA6197C units, one operating in the frequency range 1.5-2 MHz and the other in the frequency range 4-8 MHz. The pre-selector switches concerned are make-before-break type to ensure that the aerial supply is not interrupted when changing frequency ranges.

15. When the equipments are connected for a common aerial, as given in para. 4 of Chapter 2 and fig. 2, the operation of the receivers and pre-selection units is the same as for individual receiver working. No inter-action between the receivers takes place.

16. In common aerial systems it should be noted that the aerial input looks like a 92 ohm section of line and should be terminated as shown in Fig. 2, but when only one receiver is used, with AE OUT

16. (cont'd)

socket (SKT2) connected to ground, the aerial input looks like a nominal 75 ohm impedance.

POWER SUPPLY UNIT

17. The AC Voltage input is fed via MAINS plug, PL1 and the POWER switch (SB) to the primary winding of transformer T1. The line input is protected by fuse FS2 and decoupled by capacitor C99. The neutral input is decoupled by capacitor C100.

18. The full-wave rectifier bridge, formed by diodes MR1 to MR4 and decoupled by capacitor C90, is connected across one secondary winding of transformer T1 via anti-surge resistor R18 and fuse FS1. The +320V output from the rectifier circuit is fed via the filter network formed by capacitor C81 and C80 and coil L27 to choke coils L25 and L26, from where it supplies the main circuitry of the unit.

19. A further secondary winding on transformer T1 provides the 6.3V heater supplies for the Tubes in the pre-selector unit. Lamp 1LP1 is connected across this secondary winding to provide an indication when power supplies are on.

FAIL SAFE

20. To improve system reliability, a STANDBY power feature and a complete by-pass to antenna signals is provided, in the event of a power supply failure.

21. Fail Safe is accomplished by (relay-contact) routing the signal around the pre-selector at switches SA1F (input) and SA13F (output). Normally open contacts are closed to apply signal to the pre-selector. Normally closed contacts bypass the signal thru coaxial cable. The relays (K1 & K2) operate only in the ON position of the power switch.

22. The standby position of the power switch supplies power to the pre-selector but the signal remains by-passed. For further details see Illustrations, Figure 7. Fail Safe Circuit.

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CHAPTER 1

TEST EQUIPMENT

Requirements

1. The following items of test equipment, as well as the associated Type RA6117 or equal h.f. receiver, are required to carry out the performance testing described in this chapter.

   (a) Signal generator covering the frequency range 1-30 MHz, having an output between 40 microvolts and 4 volts at 75 ohms impedance.

   (b) Noise generator having an output of 1 to 20 dB into 75 ohms.

   (c) Audio output power meter.

   (d) Universal bridge covering the range of 0 to 250 pF. (The bridge is used only for aligning variable capacitors).

   (e) Vacuum Tube Voltmeter (VTVM), with high input impedance and low input capacitance, covering the range 0-250 mV, with 40 dB probe is suitable.

   (f) Simpson Model 60 or similar type. Multimeter, 20,000 ohms/V.

   (g) One 75 ohm 1/4 W 5% resistor.

   (h) One 92 ohm 1/4 W 5% resistor.

CHAPTER 2

PERFORMANCE CHECKS

Preliminary Checks

1. With the MA6197C on the work bench, carry out the following preliminary checks.

   (1) Check that the fuses are of correct rating (i.e. FS1, 150 mA and FS2, 2A).

   (2) Check that the a.c. MAINS VOLTAGE ADJUSTMENT selector plugs are inserted to match the correct line voltage available. Switch power on.

   (3) Remove the retaining screws securing the top and bottom screening covers and remove the covers.

   (4) With the Multimeter set to 1000V d.c. range, check the d.c. power supplies between the junction of the coils L27 and L25 to ground, this voltage should be 320V $\pm$ 10V.

   (5) With the Multimeter set to 10V a.c. range, check the heater supply across the HEATER WINDING Test points of transformer T1, this voltage should be 6.3V $\pm$ 0.2V.

PERFORMANCE CHECKS

2. Connect the MA6197C, the receiver and the test equipment to a common ground point ensuring that a good connection is made.

NOTE: Performance checks should be made with the covers fitted.

Sensitivity Tests

3. (1) Connect the signal generator output to the antenna AE IN socket of the MA6197C, connect the antenna AE OUT socket to ground.

   (2) Connect the Vacuum Tube Volt Meter (VTVM) to the RF OUT socket and ground and connect the 75 ohm resistor between the RF OUT socket and ground.

3. (3) Set the RANGE MHz switch on the front panel of the pre-selector unit to the 1-2 MHz position and set the POWER switch to on.

(4) Set the pre-selector tuning control to indicate 1.5 MHz on the tuning dial.

(5) Set the signal generator frequency to approximately 1.5 MHz and tune the maximum output with output level from generator of 50 mV e.m.f.

(6) The VTVM indication should not be less than 11 mV.

(7) Set the pre-selector tuning control to indicate 2 Mc/s on the tuning dial.

(8) Set the signal generator frequency to 2 MHz and the output power level to 50 mV e.m.f. Fine tune for maximum output.

(9) The VTVM indication should not be less than 11 mV.

(10) Maintain the signal generator output power level at 50 mV e.m.f. and carry out testing in a similar manner to that described in operations (3) to (9), but using the Signal Generator frequency, RANGE MHz switch setting and the Tuning dial setting given in the following table.

Signal Generator Output Frequency MHz	Range switch setting MHz	Tune dial setting Mc/s	Vacuum Tube Voltmeter indication
2	2 - 4	2	110
3	2 - 4	3	150
4	2 - 4	4	190
4	4 - 8	4	140
6	4 - 8	6	200
8	4 - 8	8	300
8	8 - 16	8	90
12	8 - 16	12	120
16	8 - 16	16	170
16	16 - 24	16	70
20	16 - 24	20	100
24	16 - 24	24	120
24	24 - 30	24	8
28	24 - 30	28	8
30	24 - 30	30	8

The voltage levels, for RANGE switch settings 2-4, 4-8, 8-16 and 16-24 MHz, are to be measured with the 40 dB probe connected between the R.F. OUT socket and the

(10) (cont'd)

VTVM. The voltage levels, for RANGE MHz switch setting 24-30 MHz, are to be measured with the AE OUT socket connected to ground via the 92 ohm resistor.

Noise Factor

4. On completion of the performance checks disconnect the signal generator from the pre-selector unit and connect the noise generator into the circuit.

(1) Connect the AUDIO IN socket on the noise generator to the PHONE socket on the HF receiver.

(2) Connect the NOISE OUT socket on the noise generator to the AE IN socket on the pre-selector unit under test.

(3) Ensure that the RF OUT socket on the pre-selector unit is connected to the RF INPUT socket on the HF receiver.

(4) Connect the AE OUT socket on the pre-selector unit direct to ground.

(5) Set the RANGE MHz switch on the pre-selector unit to 1-2 MHz.position and the tuning control on the pre-selector unit to indicate 1.5 MHz on the tuning dial.

(6) Set the controls on the HF receiver, as follows:-

BFO	ON
BANDWIDTH	3 KC
RF/IF GAIN	MAXIMUM (fully clockwise)
RF RANGE	1-2 Mc/s
MEGACYCLES	1 Mc/s
KILOCYCLES	500 kc/s (tune for maximum output)

(7) Adjust the HF receiver controls, RF TUNE and MEGACYCLES and KILOCYCLES to give maximum indication of the noise generator OUTPUT meter.

(8) Adjust the A.F. GAIN control on the HF receiver to give an indication of 10 dB on the noise generator OUTPUT meter.

(9) Set the DIODE CURRENT switch on the noise generator to 100 mA and adjust the DIODE CURRENT control to increase the indication on the OUTPUT meter by 3 dB. Check that the indication on the NOISE FACTOR meter is not greater than 12 dB.

NOTE: Return the DIODE CURRENT switch to center position immediately after the noise factor reading has been taken.

(10) Repeat operations (5) to (9), but with the RF RANGE control and MEGACYCLES settings in operation (6) set to 1.975 Mc/s and the tuning dial reading in operation (5) set to 2 Mc/s - 25 kc/s.

(11) Set the RF RANGE control operation (6) to the WIDEBAND (W.B.) position. Repeat operations (5) to (9), with the RANGE MHz switch, tuning dial and MEGACYCLES control set as indicated in the following table, to obtain maximum indication on the noise generator OUTPUT meter; the tuning dial setting on the MA6197C may have to be adjusted slightly for maximum output.

MA6197C Range switch setting MHz	MA6197C Tuning dial reading (Mc/s)	HF Receiver RF Tune (Mc/s)
1.5 - 2	1.5	1.5 + 25 kc/s
2 - 4	2	2 + 25 kc/s
2 - 4	3	3 + 25 kc/s
2 - 4	4	4 - 25 kc/s
4 - 8	4	4 + 25 kc/s
4 - 8	6	6 + 25 kc/s
4 - 8	8	8 - 25 kc/s
8 - 16	8	8 + 25 kc/s
8 - 16	12	12 + 25 kc/s
8 - 16	16	16 - 25 kc/s
16 - 24	16	16 + 25 kc/s
16 - 24	20	20 + 25 kc/s
16 - 24	24	24 + 25 kc/s

(12) Set the RANGE switch to the 24-30 MHz position. Set the Receiver RF RANGE switch to 16-30 Mc/s position, connect the 92 ohms resistor between aerial out socket and ground. With all other control settings remaining as at the end of testing in operation (11) repeat operations (5) to (11). In this case, the RF TUNE control will have to be adjusted to obtain maximum indications (7). The noise factor reading obtained should not be greater than 15 dB.

(13) Set the tuning dial to give a reading of 30 Mc/s. Set the MEGACYCLES control to give a reading of 30 Mc/s - 25 kc/s and repeat operations (5) to (11). The noise factor reading obtained should not be greater than 15 dB.

Attenuation

5. On completion of the noise factor checks, disconnect the noise generator and connect the signal generator into the circuit as shown in Fig. 3 and connect the 92 ohm resistor between Antenna AE OUT and ground.

(1) Set the RANGE MHz switch on the pre-selector unit to the 2-4 MHz position and adjust the tuning control to give a reading of 2 Mc/s on the tuning dial.

(2) On the receiver set the MEGACYCLES control to 2 Mc/s position, set the RF RANGE to the WIDEBAND 75 ohm position and set the RF/IF GAIN control to maximum.

(3) Set the signal generator output frequency to 2 Mc/s, at an output level of 40 microvolts.

(4) Adjust the pre-selector unit for maximum output on r.f. meter.

(5) Reduce the output level of the signal generator to the lowest value which will give a convenient reading on the, H.F. receiver's, output meter. Note the output level of the signal generator.

(6) Off-tune the signal generator and the h.f. receiver frequency to 1.9 Mc/s, increase the output level of the signal generator to restore the meter reading on the receiver to that obtained in operation (5). Note the output level of the signal generator which should be at least 94 dB greater than the output level noted in operation (5).

(7) Off-tune the signal generator output frequency and the HF receiver to 2.1 Mc/s. Adjust the output level of the signal generator to restore the meter on the receiver to the output level obtained in operation (5). Note the signal output level of the signal generator which should be at least 94 dB greater than the output level noted in operation (5).

(8) Repeat operations (4), (5), (6) and (7) for the following frequencies, with the controls set to the appropriate frequency range and frequencies.

RANGE POSITION	FREQUENCY (Mc/s)	Kc/s OFF-TUNE
2	2	± 100
2	3	± 150
2	4	± 200
3	4	± 200
3	6	± 300
3	8	± 400
4	8	± 400
4	12	± 600
4	16	± 800
5	16	± 800
5	20	± 1000
5	24	± 1200

Frequencies 5% off tune are attenuated on RF RANGE positions: 5(16-24 MHz) 86 dB minimum, 4(8-16 MHz) 94 dB minimum, 2(2-4 MHz) 100 dB minimum, 3(4-8 MHz) 100 dB with an exception 8 Mc/s where 90 dB minimum can be further attenuated by adjusting coil L37.

CHAPTER 3

FAULT LOCATION

Introduction

1. This unit consists in the main of a power supply circuit and two cascode amplifiers coupled by tuned circuits. Conventional fault location techniques should be employed throughout this unit.

TUBE DATA

2. Details of tubes used in this unit are given in Tables 1 and 2. The location of tubes is shown in Fig. 4 and tube base connections are given in the circuit diagram. Voltages were obtained from an adapter tube base using a 20,000 ohm/volt meter on the optimum range in each case. Tube pin numbers are indicated in brackets in Table 1.

TABLE 1

Tube Complement and Typical d.c. voltages

Cct Ref.	Plate (Tube Pin Nos. in brackets)	Cathode	Function
V1A	270V (1)	(3) 135V	R.F. amplifier
V1B	135V (6)	(8) 1.8V	
V2A	270V (1)	(3) 135V	R.F. amplifier
V2B	135V (6)	(8) 1.8V	

TABLE 2

Tube Base Connections

Pin No.	12AU7 EEC82 CV491
1	plate 2
2	grid 2
3	cathode 2
4	heater
5	heater
6	plate 1
7	grid 1
8	cathode 1
9	heater tap

CHAPTER 4

ALIGNMENT

Introduction

1. The following alignment procedures are to be carried out if any part of the unit fails to meet the performance checks (Chap. 2, para. 3 to 6). The alignment of variable capacitors (para. 9) are factory aligned and require no further adjustment unless a variable capacitor has been replaced.

2. For location of coils and variable capacitors and trimmer capacitors see Figs. 4 and 5.

Alignment of Variable Capacitors

NOTE: This work should only be carried out by personnel skilled in aligning equipment similar to the MA6197C.

3. (1) Set the POWER switch to the off position and disconnect the screened leads at tag 1 of wafer SA3F and SA3B.

(2) Set the RANGE switch to the 1-2 MHz position.

(3) Adjust the TUNE control fully counter-clockwise (vanes of variable capacitors C37, C44, C63, C36, C79 and C64 fully out of mesh).

(4) Slightly open out the outside vanes of the first three sections of the variable capacitors (vanes nearest the chassis).

(5) Adjust the TUNE control to give a reading of 8 Mc/s on range 4 of the tuning dial.

(6) Loosen the two screws on the retaining collars for the anti-backlash gears (ensure that the anti-backlash gears do not come out of mesh).

(7) Adjust the vanes of the variable capacitors C37 and C44 until they are fully meshed.

(8) Connect the Universal bridge across the variable capacitors, C37 & C44 in turn, and measure their capacitance.

(9) Set the capacitor with the lowest capacitance to approximately 213 pF by slightly reducing its fully meshed condition.

3. (10) Measure the value of the other capacitor and record the values of both capacitors.

(11) Disconnect the universal bridge and tighten the screws on the retaining collars for the anti-backlash gears of capacitors C37 and C44.

(12) Repeat operations (6) to (11) with capacitors C63, C36 and C64, C79.

(13) Adjust the tuning control to give a reading of 16 Mc/s on range 5 of the tuning dial. (Use the figure 1 of the numeral 16 as a tuning mark).

(14) Connect the capacitance bridge across each variable capacitor in turn and record the values of each variable capacitor which should be approximately 83 pF. It is essential that the variable capacitors C37 and C44 should be as near 83 pF as possible. If necessary knife the appropriate vanes.

(15) Adjust the TUNE control to give a reading of 16 Mc/s on range 4 of the tuning dial. Measure and record the capacitance of each of the six capacitors.

(16) Measure and record the capacitance of the six variable capacitors for a tuning dial reading of 15 Mc/s, 14 Mc/s, 13 Mc/s, 12 Mc/s, 11 Mc/s, 10 Mc/s and 9 Mc/s.

(17) Subtract the value of capacitance recorded in operation (15) for each variable capacitor from the value of capacitance recorded in operation (16) for each variable capacitor at each frequency setting, record the results.

(18) Select the highest and lowest figure obtained in operation (17) for each frequency, and note the difference between these two figures, this difference is the maximum error between the six variable capacitors at each frequency and it should not be greater than the limits shown in the following table.

FREQUENCY	MAXIMUM ERROR
8 Mc/s	1.6 pF
9 Mc/s	1.4 pF
10 Mc/s	1.3 pF
11 Mc/s	1.1 pF
12 Mc/s	1.0 pF
13 Mc/s	0.8 pF
14 Mc/s	0.6 pF
15 Mc/s	0.5 pF

3. (cont'd)

Typical results for frequency settings of 15 Mcs and 16 Mcs are as follows:-

CAPACITOR	CAPACITANCE (pF)			
	15 Mc/s	16 Mc/s	DIFFERENCE	MAX ERROR
C37	26.9	18.0	8.9	
C44	27.1	18.4	8.7	Highest
C36	26.7	18.2	8.5	reading 8.9
C63	26.1	17.4	8.7	lowest 8.5 max.
C79	26.2	17.4	8.8	error 0.4 pF
C64	26.8	18.2	8.6	Acceptable.

(19) If the maximum error figures are outside the limits specified in operation (18), the variable capacitors must be knifed, as follows:-

(20) Examine the results obtained in operation (18) and, starting at 15 Mc/s, knife in the variable capacitors whose capacitances are at greater divergence than the others. Re-check capacitances at 15 Mc/s and 16 Mc/s and check that the results are now within the specified limit. Continue recording the capacitances values for each variable capacitor throughout the complete range, checking the differences and knifing where necessary, until the required results are obtained. If it is necessary to knife the vanes of variable capacitors C37 and C44, check that, on the tuning dial range 5 and 16 Mc/s, the capacitances of these is still as near 83 pF as possible.

(21) Disconnect the test equipment and connect the screened leads to tags 1 of the switch wafers SA3F and SA3B.

Alignment of Tuned Circuits

4. (1) Connect the signal generator to the antenna AE IN socket on the MA6197C.

(2) Connect the antenna AE OUT socket on the MA6197C direct to ground.

(3) Connect the 75 ohm 1/4W resistor between the R.F. OUT socket (SKT3) and ground.

(4) Connect the Vacuum Tube voltmeter across the 75 ohm resistor.

(5) Ensure that the unit and test equipment are connected to a common ground point and that a good connection is made.

(6) Set the tuning control on the MA6197C to give a reading of

(6) 2 Mc/s on the tuning dial and set the RANGE switch to the 1-2 MHz position.

(7) Set the signal generator frequency to 2 Mc/s, at an output level of 50 mV and set the power switch on the MA6197C to on.

(8) Finally adjust trimmer capacitor C23 to give a maximum indication on the vacuum tube voltmeter.

(9) Set the tuning control on the MA6197C to give a reading of 1.5 Mc/s on the tuning dial.

(10) Set the signal generator frequency to 1.5 Mc/s at an output level of 50 mV.

(11) Adjust the core of coil L7 to give a maximum indication on the front panel meter.

(12) If necessary repeat operations (6) to (11) until optimum results are obtained.

(13) With a frequency of 2 Mc/s set on the 1-2 MHz range of the MA6197C note that the voltmeter indication is not less than 11 mV.

(14) With a frequency of 1.5 Mc/s set on the MA6197C note that the voltmeter indication is not less than 11 mV.

(15) Set the RANGE switch on the MA6197C in the 2-4 MHz position and carry out alignment along the lines indicated in operations (6) to (12) but adjusting the following components at the appropriate frequencies, trimmer capacitors C24, C25, C41, C55, C69 and C86, at 4 MHz;coils L8, L9, L17, L21, L28 and L32 at 2 MHz.

NOTE: B+ potential is present at trimmer capacitors C41 and C67.

(16) Tune the generator to 3 Mc/s and the MA6197C for maximum output, note the voltmeter reading. Off tune the MA6197C by 150 kc/s and adjust the core of coil L36 to give a reading of at least 100 dB below the reading noted above.

(17) Check that the voltmeter indications at 2 Mc/s, 3 Mc/s and 6 Mc/s are not less than 110 mV, 150 mV and 190 mV respectively. Set the RANGE switch on the MA6197C to the 4-8 MHz position and carry out alignment along the lines indicated in operations (6) to (12), but adjusting the following components at the appropriate frequencies.

(17) Trimmer capacitors C26, C27, C43, C56, C67 and C87 at 8 Mc/s. Coils L10, L11, L18, L22, L29 and L33 at 4 Mc/s.

NOTE: B+ potential is present at trimmer capacitors C43 and C69.

(18) Tune the generator to 6 Mc/s and the MA6197C for maximum output, note the voltmeter reading. Off-tune the MA6197C by 300 kc/s and adjust the core of coil L37 to give a reading of at least 90 dB below the reading noted above.

(19) Check that the voltmeter indications at 4 Mc/s, 6 Mc/s and 8 Mc/s are not less than 140 mV, 200 mV and 300 mV respectively.

(20) Set the RANGE switch on the MA6197C to the 8-16 MHz position and carry out alignment along the lines indicated in operations (6) to (14), but adjusting the following components at the appropriate frequencies. Trimmer capacitors C28, C29, C42, C57, C68 and C88 at 16 Mc/s. Coils L12, L13, L19, L23, L30 and L34 at 8 Mc/s.

NOTE: B+ potential is present at trimmer capacitors C42 and C68.

(21) Check that the voltmeter indications at 8 Mc/s, 12 Mc/s and 16 Mc/s are not less than 90 mV, 120 mV and 170 mV respectively.

(22) Set the RANGE switch on the MA6197C to the 16-24 MHz position and carry out alignment along the lines indicated in operations (6) to (14), but adjusting the following components at the appropriate frequencies. Trimmer capacitors C30, C31, C40, C58, C65 and C89 at 24 Mc/s.

NOTE: B+ potential is present at trimmer capacitors C40 and C65.

(23) Check that the voltmeter indications at 16 Mc/s, 20 Mc/s and 24 Mc/s, are not less than 70 mV, 100 mV and 120 mV respectively.

(24) Set the RANGE switch on the MA6197C to the 24-30 MHz position, remove ground connection from the AE OUT socket and connect the 92 ohm resistor between this socket and ground then carry out alignment along the lines indicated in operations (6) to (12), but adjusting the following components at the appropriate

(24) frequencies. Trimmer capacitor C32 at 30 Mc/s. Coil L16 at 24 Mc/s.

(25) Check that the voltmeter indications at 24 Mc/s, 28 Mc/s and 30 Mc/s are not less than 8 mV. Do not use the probe when making these final measurements.

(26) Disconnect the resistor and the voltmeter from R.F. OUT socket SKT3 of the MA6197C and connect the R.F. output to the antenna input socket of the receiver.

(27) Using the R.F.meter of the receiver retune trimmer capacitors C86 and C89 at approximately mid-position of each range.

CHAPTER 5

PREVENTIVE MAINTENANCE

MECHANICAL

1. Daily. Wipe over all exterior surfaces of the unit with a dry duster. Carry out visual checks on all exterior items, i.e. control knobs, sockets etc. Check control knobs for security on shafts and toggle switch for positive sharp operation.

2. Six Monthly. Remove top and bottom screening cover (Chapter 1, para. 2) and clean interior with soft brush and vacuum cleaner. Check security of all retaining screws on the unit, all removable components, i.e. tubes etc., check that the tubes are seated correctly in their bases. Lubricate the Tuning control gear sparingly, with grease.

ELECTRICAL CHECKS

3. Six Monthly. Carry out a visual check on all components and examine particularly for signs of overheating and deterioration, parts showing such signs must be tested at the earliest convenient time.

DISMANTLING

4. The MA6197C should be removed from its rack, by removing the six securing screws on the front panel, sliding out the unit, and disconnecting plugs and sockets at the rear of the unit. The unit has two cover plates, top and bottom, secured by screws passing into tapped bushes in the outer framework.

REPLACING COMPONENTS

5. As conventional circuit wiring techniques have been employed throughout, no difficulty should be experienced if it is necessary to remove and replace any components.

CHAPTER 6

REPLACEMENT

PARTS LIST

Ckt. Ref.	Description	Value	Tol %	Rating	Mfr. Part No. Mil Type Desig.
RESISTORS					
R1	Fixed Composition	47K	5	1/4 W	RC07GF473J
R2	Fixed Composition	470K	5	1/4 W	RC07GF474J
R3	Fixed Composition	150	5	1/4 W	RC07GF151J
R4	Fixed Composition	150	5	1/4 W	RC07GF151J
R5	Wirewound	680	3	4 W	Dale G-5
R6	Wirewound	680	3	4 W	Dale G-5
R7	Wirewound	680	3	4 W	Dale G-5
R8	Wirewound	680	3	4 W	Dale G-5
R9	Fixed Composition	470K	5	1/4 W	RC07GF474J
R10	Fixed Composition	47K	5	1/4 W	RC07GF473J
R11	Fixed Composition	10	5	1/4 W	RC07GF100J
R12	Fixed Composition	150	5	1/4 W	RC07GF151J
R13	Fixed Composition	150	5	1/4 W	RC07GF151J
R14	Wirewound	680	3	4 W	Dale G5
R15	Wirewound	680	3	4 W	Dale G5
R16	Wirewound	680	3	4 W	Dale G5
R17	Wirewound	680	3	4 W	Dale G5
R18	Wirewound	560	3	10 W	Dale HG-10
R19	NOT USED				
R20	NOT USED				
R21	Fixed Composition	10	5	1/4W	RC07GF100J
R22 thru R29	NOT USED				
R30	Metal oxide	180	5	1/4 W	Corning C4
R31	Metal oxide	4.7K	5	1/4 W	Corning C4
R32	Metal oxide	4.7K	5	1/4 W	Corning C4
R33	Metal oxide	270	5	1/4 W	Corning C4
R34	Metal oxide	270	5	1/4 W	Corning C4
R35	Metal oxide	82	5	1/4 W	Corning C4
CAPACITORS					
C1	Mica	22pF	5	500 V	CM05E220JN3
C2	Mica	22pF	5	500 V	CM05E220JN3
C3	Mica	27pF	5	500 V	CM05E270JN3
C4	Mica	27pF	5	500 V	CM05E270JN3
C5	Mica	22pF	5	500 V	CM05E220JN3

Ckt. Ref.	Description	Value	Tol %	Rating	Mfr. Part No. Mil Type Desig.
CAPACITORS (cont'd)					
C6	Mica	22 pF	5	500 V	CM05E220JN3
C7	Mica	22 pF	5	500 V	CM05E220JN3
C8	Mica	22 pF	5	500 V	CM05E220JN3
C9	Mica	18 pF	5	500 V	CM05C180JN3
C10	Mica	18 pF	5	500 V	CM05C180JN3
C11	Mica	15 pF	5	500 V	CM05C150JN3
C12	Mica	15 pF	5	500 V	CM05C150JN3
C13	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C14	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C15	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C16	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C17	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C18	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C19	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C20	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C21	Ceramic	0.015 uF	20	600 V	Centralab, DD-153
C22	Mica	12 pF	5	500 V	CM05C120JN3
C23	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C24	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C25	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C26	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C27	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C28	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C29	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C30	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C31	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C32	Variable air	3-30 pF		350 V	Mullard,CVA 60A
C33	Polystyrene	8.2 pF	1 pF	125 V	915395, Racal
C34	Mica	15 pF	5	500 V	CM05C150JN3
C35	Mica	15 pF	5	500 V	CM05C150JN3
C36	2 gang, variable	217pF		350 V	Jackson Bros,AD20542
C37	2 gang, variable	217pF		350 V	Jackson Bros,AD20542
C38	Mica	12 pF	5	500 V	CM05C120JN3
C39	Ceramic	.005 uF	20	500 V	Centralab, DD502
C40	Variable air	3-30pF		350 V	Mullard,CVA 60A
C41	Variable air	3-30pF		350 V	Mullard,CVA 60A
C42	Variable air	3-30pF		350 V	Mullard,CVA 60A
C43	Variable air	3-30pF		350 V	Mullard,CVA 60A

Ckt. Ref.	Description	Value	Tol %	Rating	Mfr. Part No. Mil Type Desig.
CAPACITORS (cont'd)					
C44	2 gang, variable	217pF		350 V	Jackson Bros,AD20542
C45	Ceramic	.005uF	20	500 V	Centralab, DD502
C46	Ceramic	0.015uF	20	600 V	Centralab, DD153
C47	Ceramic	0.015uF	20	600 V	Centralab, DD153
C48	Ceramic	0.015uF	20	600 V	Centralab, DD153
C49	Ceramic	0.015uF	20	600 V	Centralab, DD153
C50	Ceramic	0.015uF	20	600 V	Centralab, DD153
C51	Ceramic	0.015uF	20	600 V	Centralab, DD153
C52	Ceramic	0.015uF	20	600 V	Centralab, DD153
C53	Ceramic	0.015uF	20	600 V	Centralab, DD153
C54	Paper	0.01uF	+100-0	1400V	Erie, CD7
C55	Variable air	3-30pF		350 V	Mullard CVA-60A
C56	Variable air	3-30pF		350 V	Mullard CVA-60A
C57	Variable air	3-30pF		350 V	Mullard CVA-60A
C58	Variable air	3-30pF		350 V	Mullard CVA-60A
C59	Polystyrene	6.8pF	1pF	125 V	915400, Racal
C60	Polystyrene	8.2pF	1pF	125 V	915395, Racal
C61	Polystyrene	22pF	1pF	125 V	915774, Racal
C62	Mica	15pF	5	500 V	CM05C150JN3
C63	2 gang, variable	217pF		350 V	Jackson Bros,AD20542
C64	2 gang, variable	217pF		350 V	Jackson Bros,AD20542
C65	Variable air	3-30pF		350 V	Mullard, CVA-60A
C66	Ceramic	0.005uF	20	500 V	Centralab, DD153
C67	Variable air	3-30pF		350 V	Mullard, CVA-60A
C68	Variable air	3-30pF		350 V	Mullard, CVA-60A
C69	Variable air	3-30pF		350 V	Mullard, CVA-60A
C70	Paper	0.01uF	+100-0	1400V	Erie, CD7
C71	Ceramic	0.015uF	20	500 V	Centralab, DD153
C72	Ceramic	0.015uF	20	500 V	Centralab, DD153
C73	Ceramic	0.015uF	20	500 V	Centralab, DD153
C74	Ceramic	0.015uF	20	500 V	Centralab, DD153
C75	Ceramic	0.005uF	20	500 V	Centralab, DD502
C76	Mica	27pF	5	500 V	CM05E270JN3
C77	Ceramic	2.2pF to 27 pF		150 V	Erie, N750A
C78	DELETED				
C79	2 gang, variable	217pF		350 V	Jackson Bros,AD20542
C80,81	Electrolytic	32uF + 32uF		350 V	Sprague, 62D
C82	Ceramic	0.015uF	20	600 V	Centralab-DD153
C83	Ceramic	0.015uF	20	600 V	Centralab-DD153
C84	Ceramic	0.015uF	20	600 V	Centralab-DD153

Ckt. Ref.	Description	Value	Tol %	Rating	Mfr. Part No. Mil Type Desig.
CAPACITORS (cont'd)					
C85	Ceramic	0.015uF	20	600 V	Centralab DD153
C86	Variable air	3-30pF		350 V	Mullard, CVA 60A
C87	Variable air	3-30pF		350 V	Mullard, CVA 60A
C88	Variable air	3-30pF		350 V	Mullard, CVA 60A
C89	Variable air	3-30pF		350 V	Mullard CVA 60A
C90	Paper	0.01uF	25	600 V	Aerovox, P123ZNP
C91	Polystyrene	15pF	1pF	125 V	915399, Racal
C92	NOT USED				
C93	Mica	3pF	5pF	500 V	CM05C150JN3
C94	Polystyrene	8.2pF	1pF	125 V	915395, Racal
C95	NOT USED				
C96	Polystyrene	18pF	1pF	125 V	26804, Racal
C97	NOT USED				
C98	Polystyrene	470pF	5	33 V	26821, Racal
C99	Paper	0.01uF	25	600 V	Aerovox
C100	Paper	0.01uF	25	600 V	P123ZNP
C101	Mica	10pF	5	500 V	CM05C100JN3
C102	Mica	10pF	5	500 V	CM05C100JN3
C103	Mica	10pF	5	500 V	CM05C100JN3
C104	Mica	10pF	5	500 V	CM05C100JN3
C105	Mica	27pF	1pF	350 V	902147, Racal
C106 thru C110	NOT USED				
C111	Polystyrene	470pF	5	33 V	26821, Racal
C112	Polystyrene	220pF	5	33 V	26821, Racal
RECTIFIERS					
MR1	Silicon rectifier	Racal, 35504			1N1222/SJ-401F
MR2	Silicon rectifier	Racal, 35504			1N1222/SJ-401F
MR3	Silicon rectifier	Racal, 35504			1N1222/SJ-401F
MR4	Silicon rectifier	Racal, 35504			1N1222/SJ-401F
INDUCTORS & TRANSFORMERS					
L1	RF Coil assy.	1-2 MHz			BA22961, Racal
L2	RF Coil assy.	2-4 MHz			CA20459, Racal
L3	RF Coil assy.	4-8 MHz			BA20481, Racal
L4	RF Coil assy.	8-16 MHz			BA20472, Racal
L5	RF Coil assy.	16-24 MHz			BA20496, Racal

Ckt. Ref.	Description	Value	Tol %	Rating	Mfr. Part No. Mil Type Desig.
INDUCTORS & TRANSFORMERS (CONT'D)					
L6	RF Coil assy.	24-30 MHz			BA21737, Racal
L7	RF Coil assy.	1-2 MHz			BA22961, Racal
L8	RF Coil assy.	2-4 MHz			CA20459, Racal
L9	RF Coil assy.	2-4 MHz			CA20459, Racal
L10	RF Coil assy.	4-8 MHz			BA20481, Racal
L11	RF Coil assy.	4-8 MHz			BA20481, Racal
L12	RF Coil assy.	8-16 MHz			BA20472, Racal
L13	RF Coil assy.	8-16 MHz			BA20472, Racal
L14	RF Coil assy.	16-24 MHz			BA20496, Racal
L15	RF Coil assy.	16-24 MHz			BA20496, Racal
L16	RF Coil assy.	24-30 MHz			BA21737, Racal
L17	RF Coil assy.	2-4 MHz			BA20490, Racal
L18	RF Coil assy.	4-8 MHz			BA20476, Racal
L19	RF Coil assy.	8-16 MHz			BA20487/1, Racal
L20	RF Coil assy.	16-24 MHz			BA20493, Racal
L21	RF Coil assy.	2-4 MHz			BA20490, Racal
L22	RF Coil assy.	4-8 MHz			BA20476, Racal
L23	RF Coil assy.	8-16 MHz			BA20487/1, Racal
L24	RF Coil assy.	16-24 MHz			BA20493, Racal
L25	Inductor r.f.				AD16987, Racal
L26	Inductor r.f.				AD16987, Racal
L27	Choke				BA15422, Racal
L28	RF Coil assy.	2-4 MHz			BA20490, Racal
L29	RF Coil assy.	4-8 MHz			BA20476, Racal
L30	RF Coil assy.	8-16 MHz			BA20487/2, Racal
L31	RF Coil assy.	16-24 MHz			BA20493, Racal
L32	RF Coil assy.	2-4 MHz			BA20490, Racal
L33	RF Coil assy.	4-8 MHz			BA20476, Racal
L34	RF Coil assy.	8-16 MHz			BA20487/2, Racal
L35	RF Coil assy.	16-24 MHz			BA20493, Racal
T1	Mains transformer				BT15421, Racal
CONNECTORS					
SK1	AE IN				UG58A/U, Kings
SK2	AE OUT				UG58A/U, Kings
SK3	RF OUT				UG58A/U, Kings
PL1	Mains (A.C. input)				Hubbel 7486

Ckt. Ref.	Description	Value	Tol %	Rating	Mfr. Part No. Mil Type Desig.
TUBES					
V1	Dual Triode				12AU7, Raytheon
V2	Dual Triode				12AU7, Raytheon
SWITCHES					
SA	Range switch wafers	1-5			CSW20539
	Range switch wafers	6-9			CSW20540
	Range switch wafers	10-13			CSW20541
SB	Power ON/STBY/OFF				Racal, 50009
MISCELLANEOUS					
FS1	Fuse	B+		150 mA	3AG, Littlefuse
FS2	Fuse, supply			2 amp	3AG, Littlefuse
1LP1	Lamp, indicator			6-8 volts	GE46
	Power Cord				
	Cable				Belden BD304
	Plug				Hubbel 7486G
	Termination, Resistive	92 ohms			Amphenol 137100
1LP2	Lamp				RCI #41009
K1	Coaxial Relay (SPDT)				RCI #51808
K2	Coaxial Relay (SPDT)				RCI #51808

ILLUSTRATIONS

Fig. No.	
1	Simplified Circuit of 16-24 MHz Range. Ranges 2-4, 4-8, 8-16 are similar; Simplified Circuit Illustration omitted.
2	Common Aerial/Antenna System.
3	Interconnections for Performance Testing - MA6197C.
4	Component Layout: Chassis Top - MA6197C.
5	Component Layout: Chassis Underside - MA6197C.
6	Circuit: Pre-Selection and Protection Unit - MA6197C.
7	Circuit: Power Supply Unit - MA6197C and Fail Safe Circuit.

Ckt. Ref.	Description	Value	Tol %	Rating	Mfr. Part No. Mil Type Desig.
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	Power Cord				
	Cable				Belden BD304
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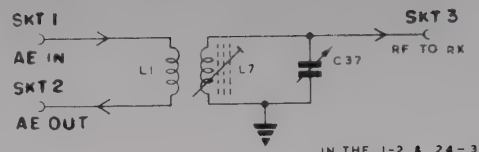
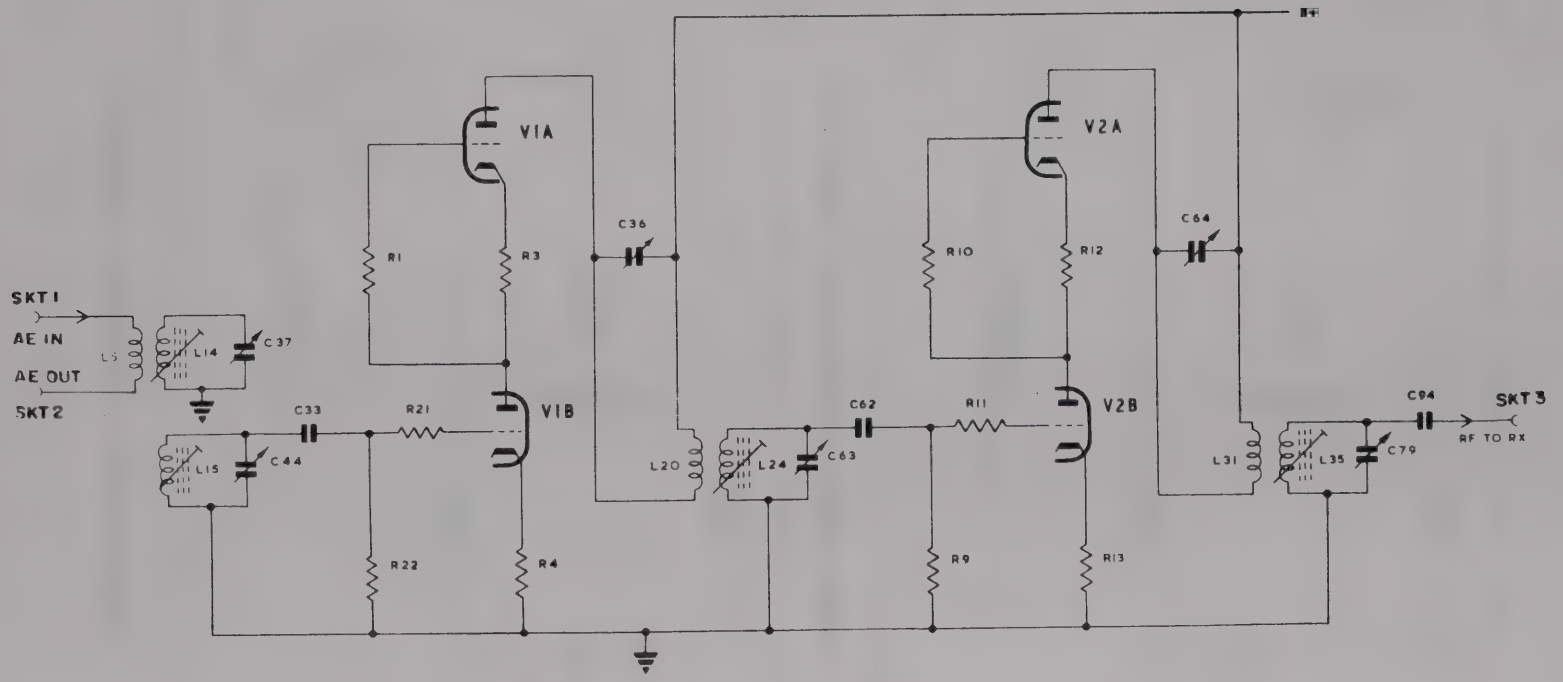
	Termination, Resistive	92 ohms			Amphenol 137100
1LP2	Lamp				RCI #41009
K1	Coaxial Relay (SPDT)				RCI #51808
K2	Coaxial Relay (SPDT)				RCI #51808



IN THE 1-2 & 24-30 Mc/s RANGES
V1 IS DIRECTLY CONNECTED TO B+
V2 IS DISCONNECTED FROM B+

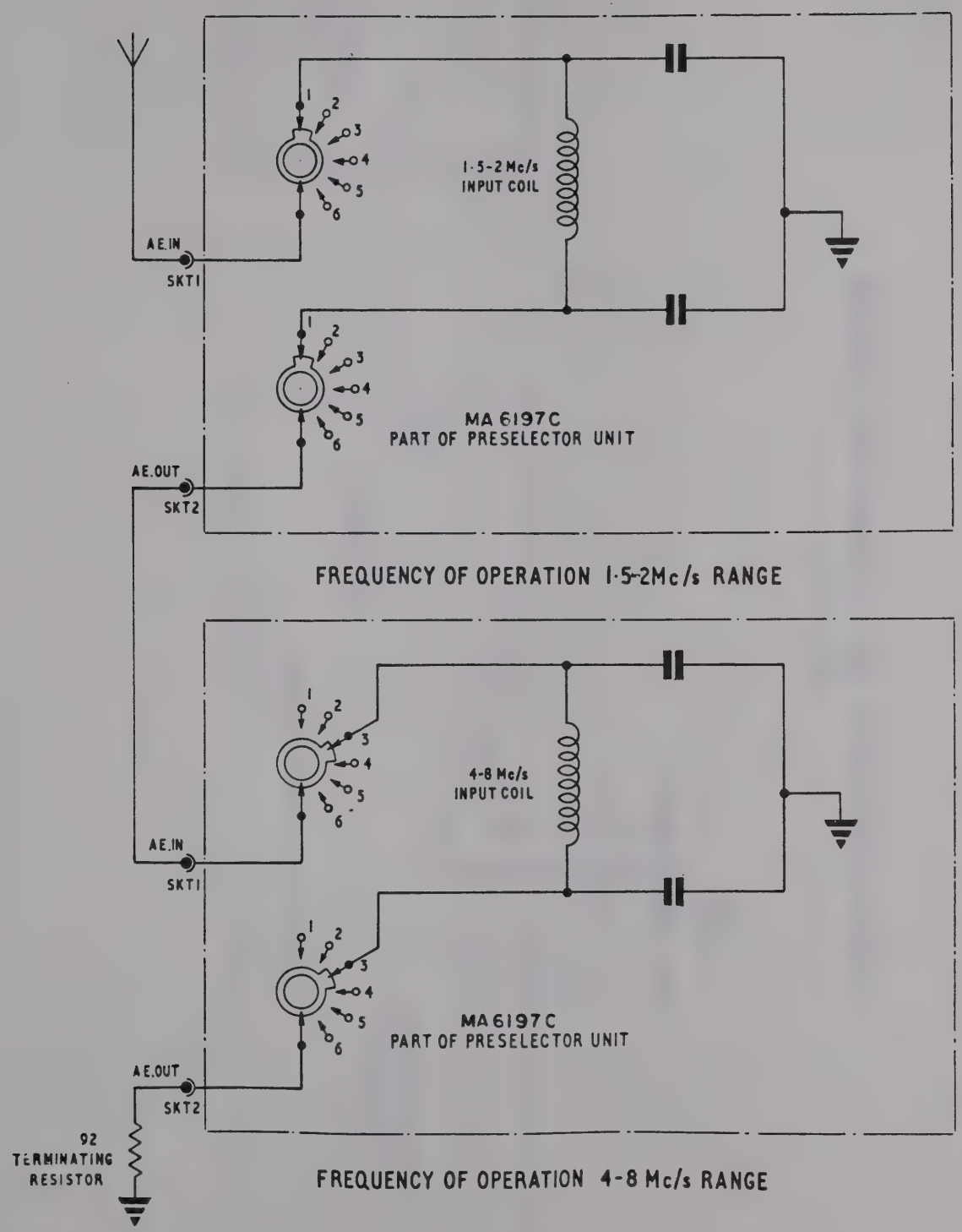
SIMPLIFIED CIRCUIT OF 1-2Mc/s RANGE - SWITCHING OMITTED (24-30Mc/s RANGE SIMILIAR)



SIMPLIFIED CIRCUIT OF 16-24Mc/s RANGE - SWITCHING OMITTED (2-4,4-8 & 8-16 Mc/s RANGES SIMILIAR)

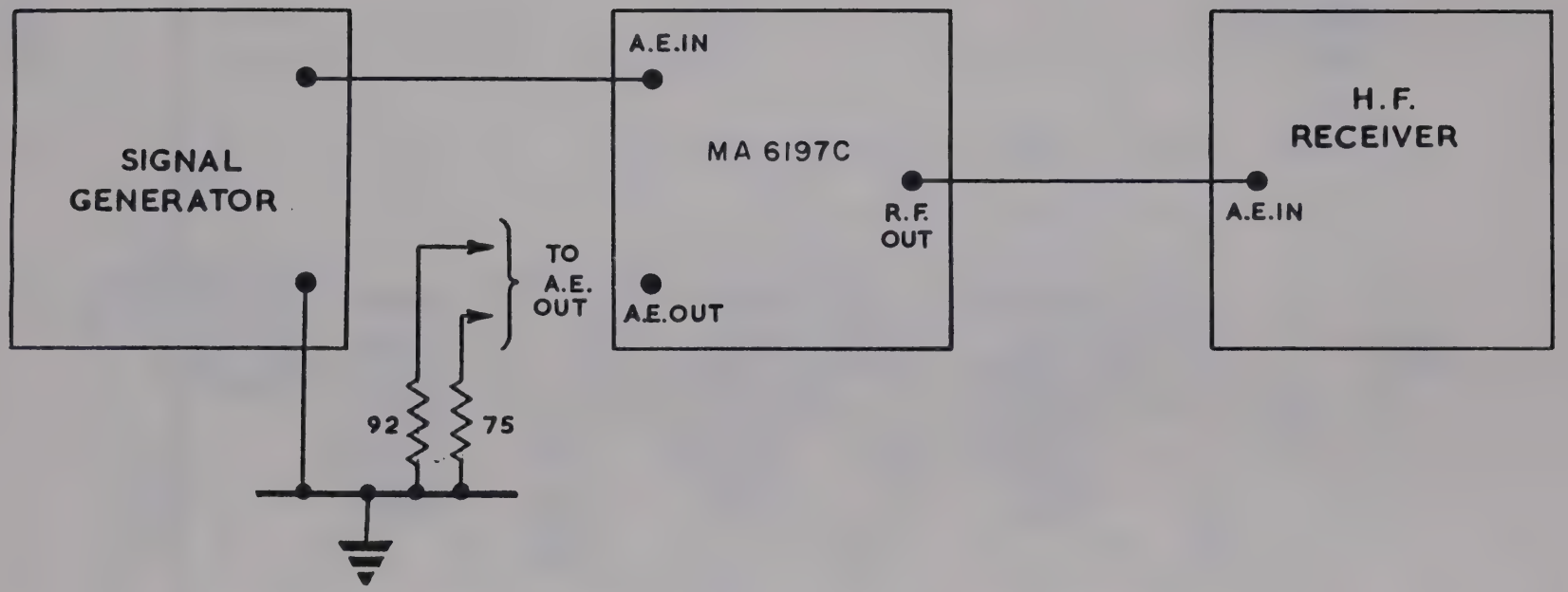
MA6197C
Simplified Circuit: Pre-selection And Protection Unit

Fig.1



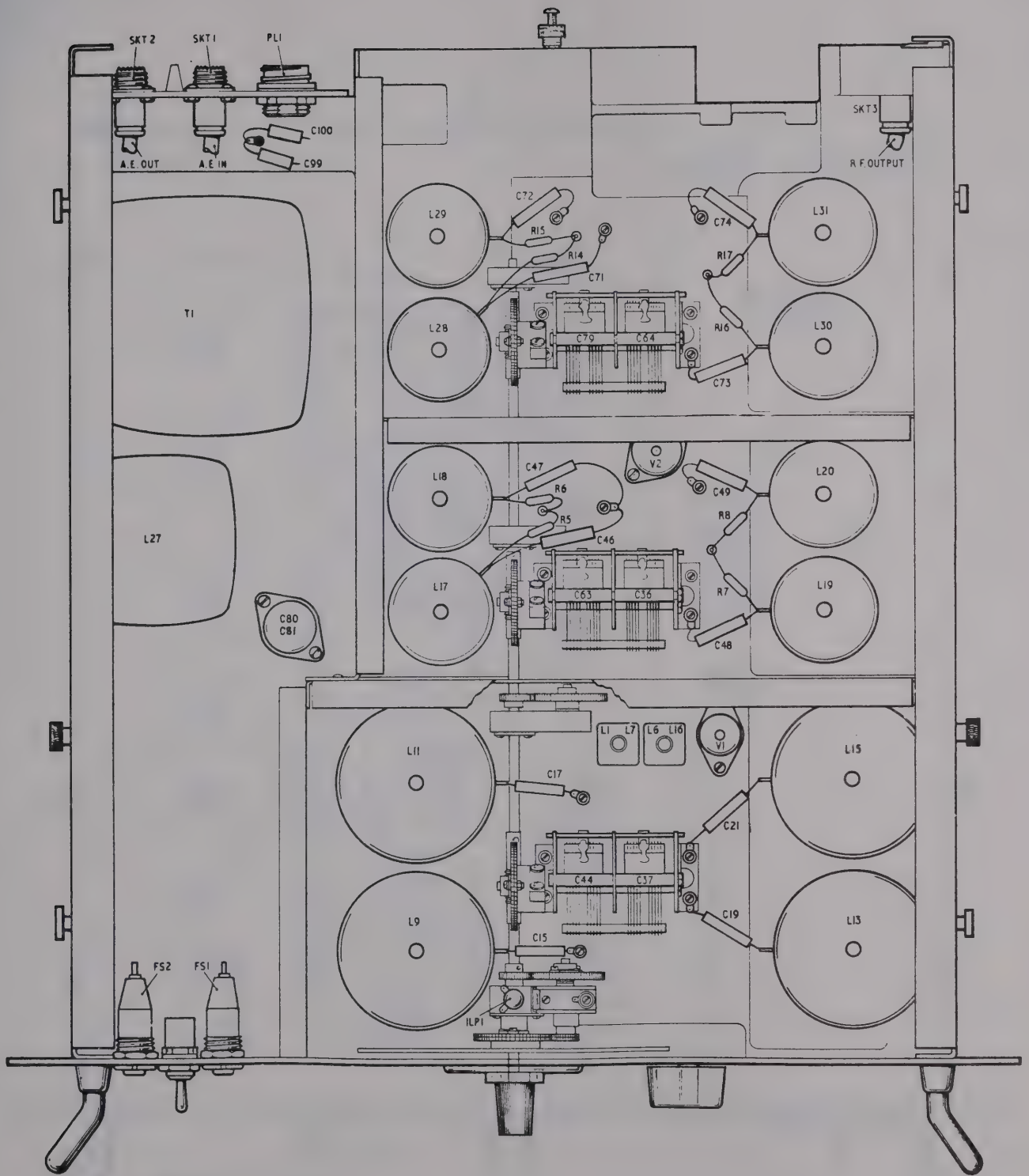
Common Aerial/Antenna System

Fig 2



MA6197C
Interconnections for Performance Testing

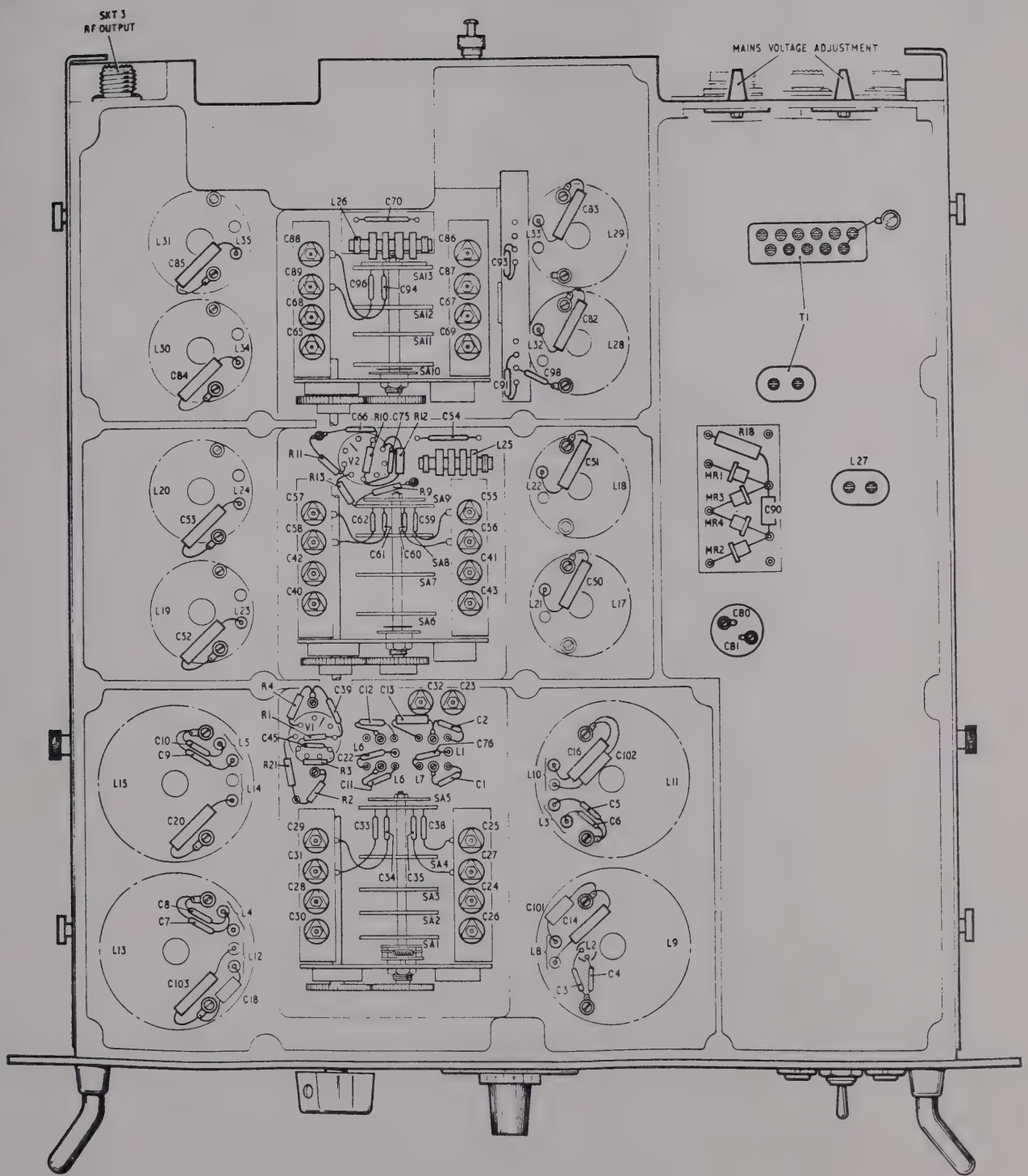
Fig. 3



COMPONENTS TO L9, L11, L13, L15, L17, L18, L19, L20, L28, L29, L30, L31 ARE SECURED TO THE TAG NEAREST TO CHASSIS

MA6197C
Component Layout : Chassis Top

Fig.4



MA 6197C
Component Layout : Chassis Underside

Fig. 5

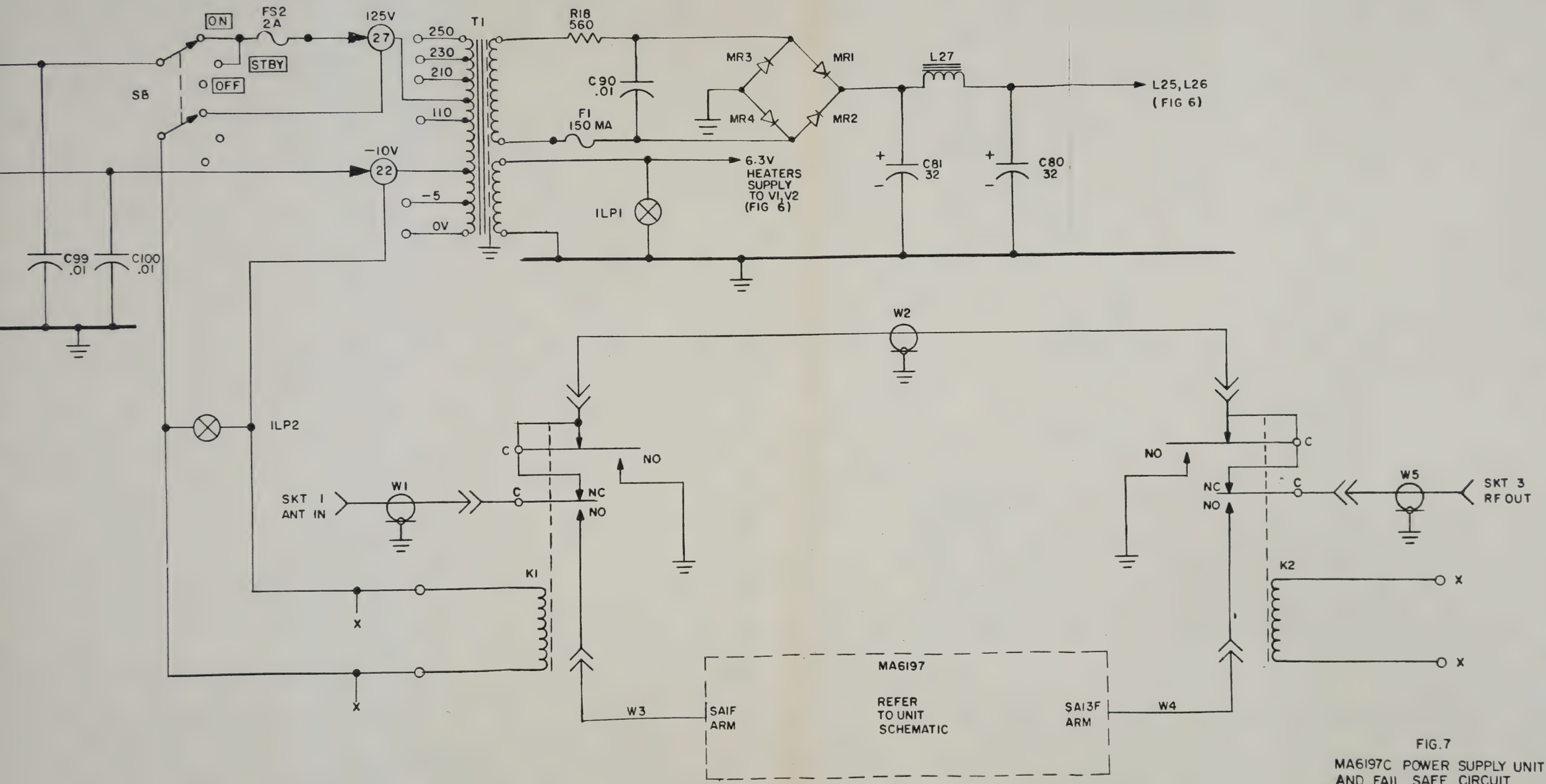
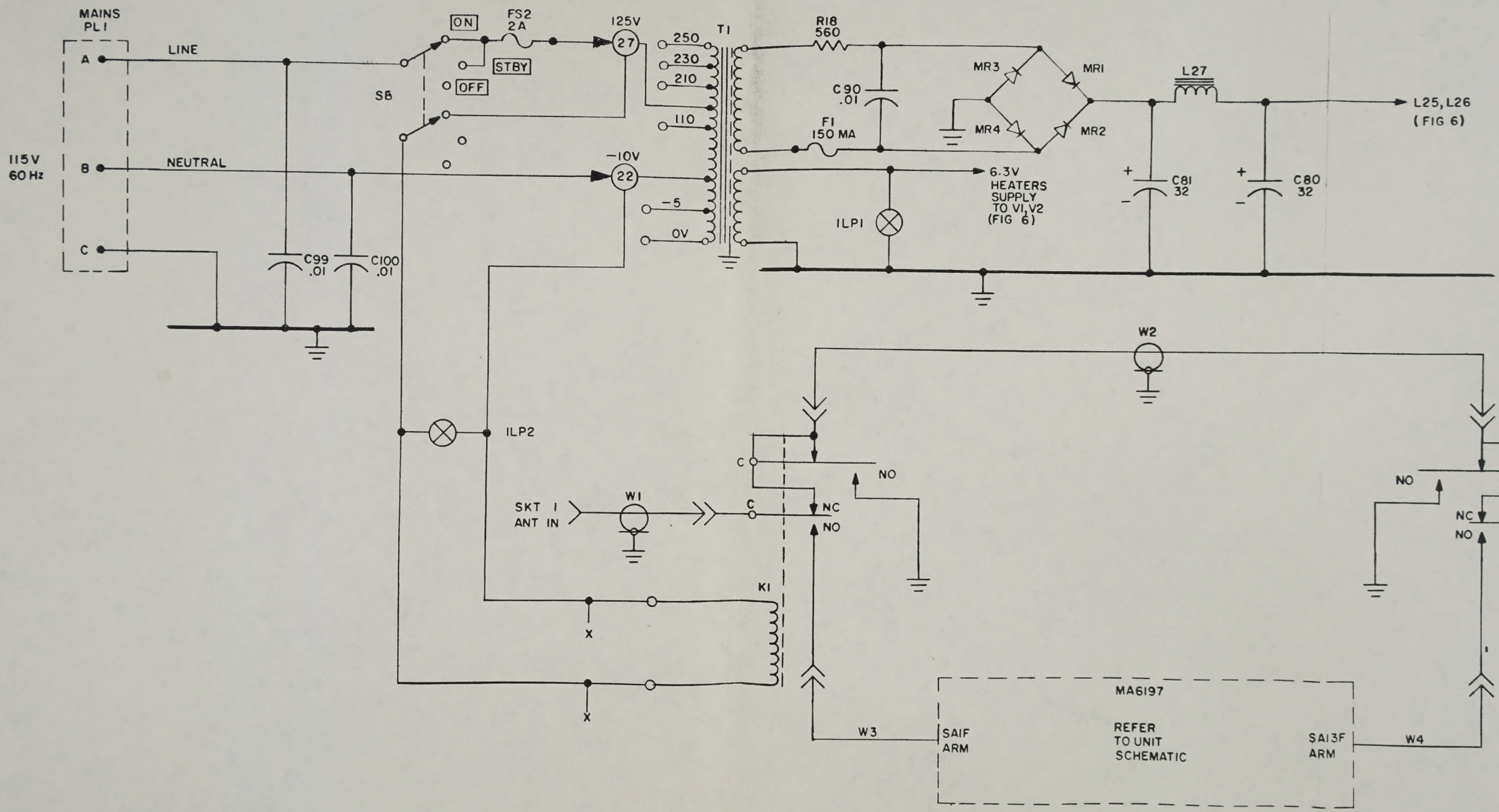
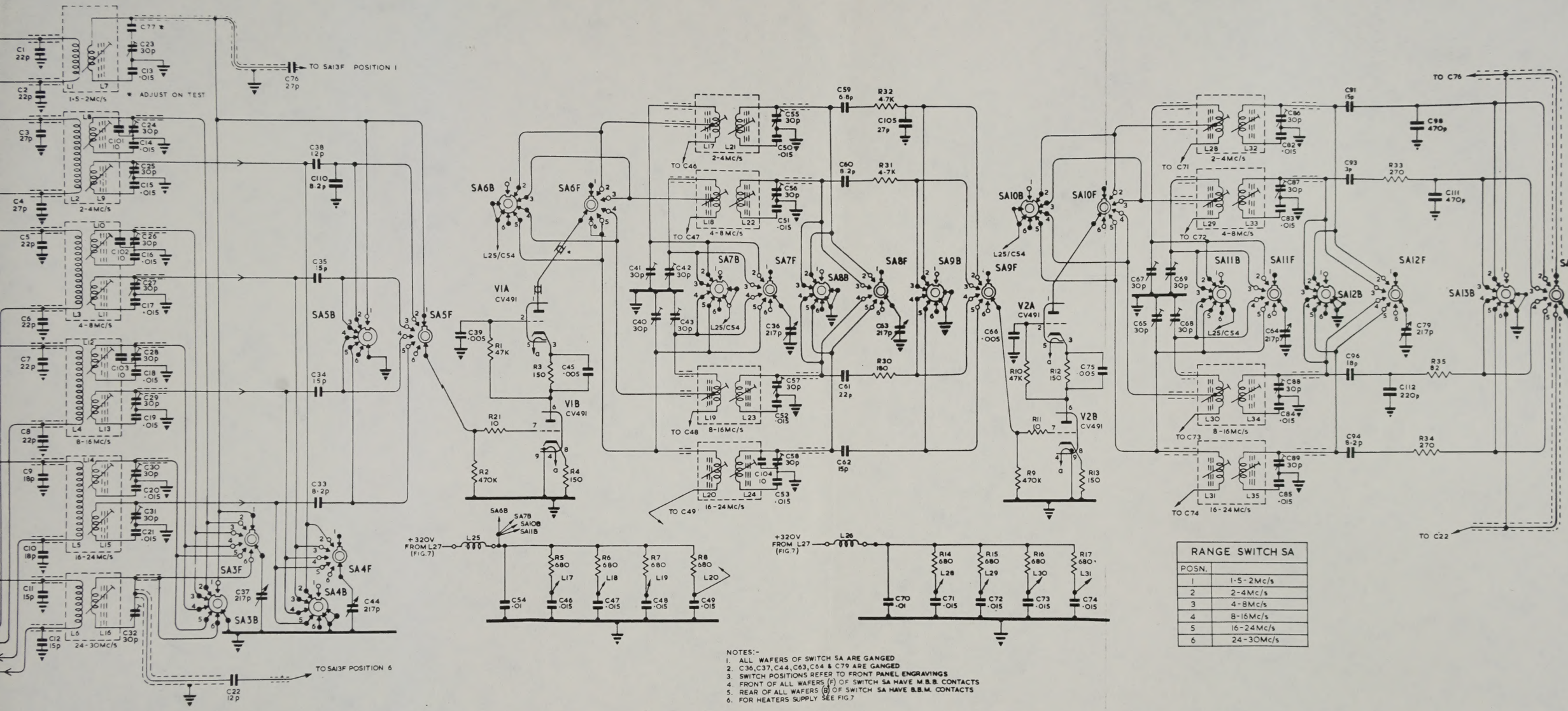


FIG.7
MA6197C POWER SUPPLY UNIT
AND FAIL SAFE CIRCUIT
DWG NO D05061


MAINS
PL1
A
LINE
B
NEUTRAL
C
115V
60 Hz
C99
.01
C100
.01
SB
ON
OFF
STBY
FS2
2A
125V
27
-10V
22
T1
250
230
210
110
-5
0V
R18
560
C90
.01
F1
150 MA
MR3
MR1
MR4
MR2
L27
L25, L26
(FIG 6)
6.3V
HEATERS
SUPPLY
TO V1, V2
(FIG 6)
ILP1
C81
32
C80
32
W2
ILP2
C
NO
SKT 1
ANT IN
W1
C
NC
NO
K1
X
X
NO
NC
NO
K2
W3
MA6197
SAIF
ARM
REFER
TO UNIT
SCHEMATIC
SAI3F
ARM
W4

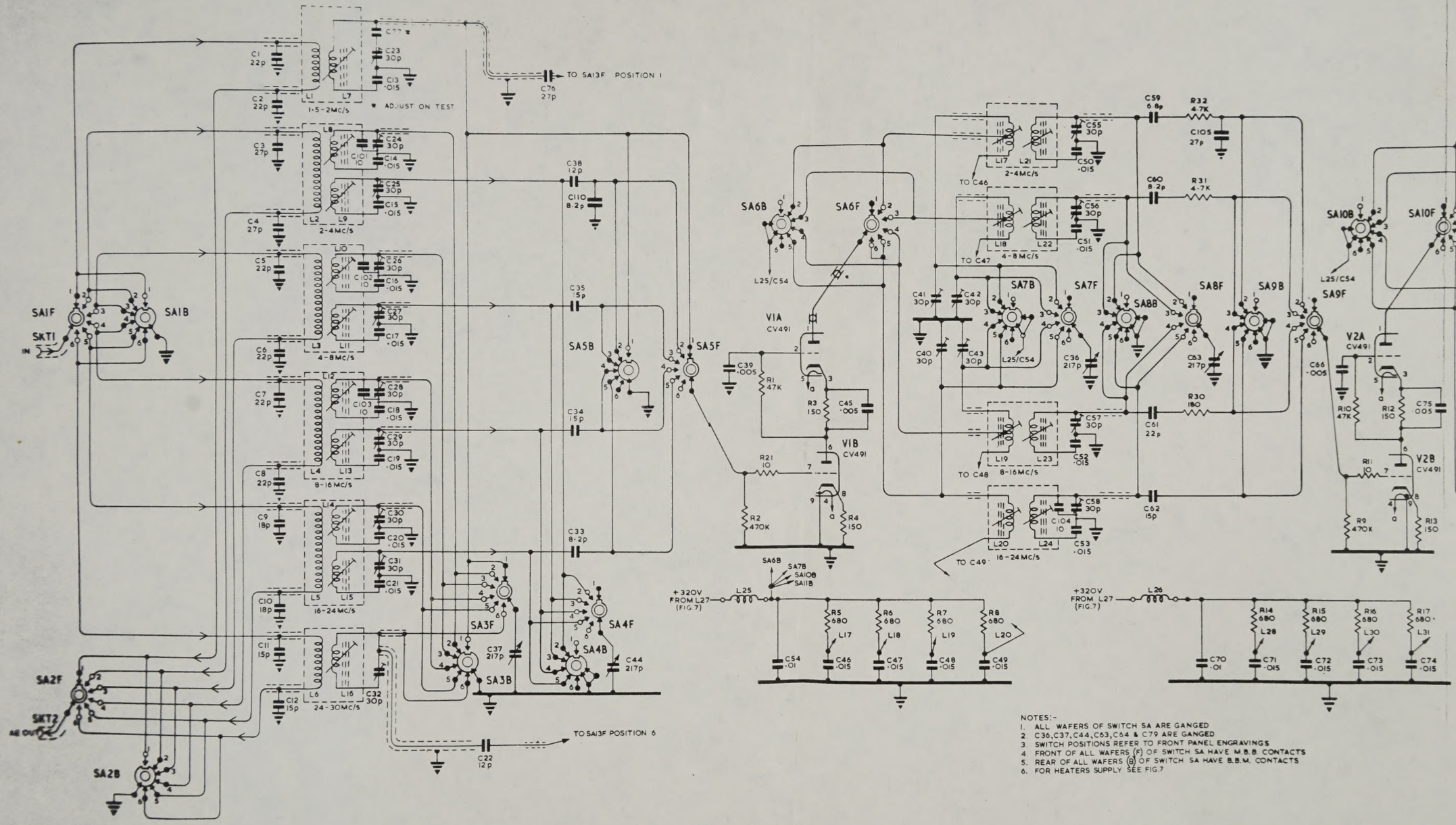


RANGE SWITCH SA	
POSN.	
1	1·5-2Mc/s
2	2-4Mc/s
3	4-8Mc/s
4	8-16Mc/s
5	16-24Mc/s
6	24-30Mc/s

NOTES:-
1. ALL WAFERS OF SWITCH SA ARE GANGED
2. C36, C37, C44, C63, C64 & C79 ARE GANGED
3. SWITCH POSITIONS REFER TO FRONT PANEL ENGRAVINGS
4. FRONT OF ALL WAFERS (F) OF SWITCH SA HAVE M.B.B. CONTACTS
5. REAR OF ALL WAFERS (B) OF SWITCH SA HAVE B.B.M. CONTACTS
6. FOR HEATERS SUPPLY SEE FIG.7

Circuit : Pre-Selection and Protection Unit — MA.6197C

Fig.6



RANGE SWITCH SA	
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4	8-16Mc/s
5	16-24Mc/s
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5. REAR OF ALL WAFERS (B) OF SWITCH SA HAVE B.B.M. CONTACTS
6. FOR HEATERS SUPPLY SEE FIG.7

ISSUE	DCB/040/C
1	

Circuit : Pre-Selection and Protection Unit — MA.6197C